National Institute of Environmental Health Sciences

Spatial patterns and socioecological drivers of dengue fever transmission in Queensland, Australia

Author(s): Hu WB, Clements A, Williams G, Tong SL, Mengersen K
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Abstract:

BACKGROUND: Understanding how socioecological factors affect the transmission of dengue fever (DF) may help to develop an early warning system of DF. OBJECTIVES: We examined the impact of socioecological factors on the transmission of DF and assessed potential predictors of locally acquired and overseas-acquired cases of DF in Queensland, Australia. METHODS: We obtained data from Queensland Health on the numbers of notified DF cases by local government area (LGA) in Queensland for the period 1 January 2002 through 31 December 2005. Data on weather and the socioeconomic index were obtained from the Australian Bureau of Meteorology and the Australian Bureau of Statistics, respectively. A Bayesian spatial conditional autoregressive model was fitted at the LGA level to quantify the relationship between DF and socioecological factors. RESULTS: Our estimates suggest an increase in locally acquired DF of 6% [95% credible interval (CI): 2%, 11%] and 61% (95% CI: 2%, 241%) in association with a 1-mm increase in average monthly rainfall and a 1 C increase in average monthly maximum temperature between 2002 and 2005, respectively. By contrast, overseas-acquired DF cases increased by 1% (95% CI: 0%, 3%) and by 1% (95% CI: 0%, 2%) in association with a 1-mm increase in average monthly rainfall and a 1-unit increase in average socioeconomic index, respectively. CONCLUSIONS: Socioecological factors appear to influence the transmission of DF in Queensland, but the drivers of locally acquired and overseas-acquired DF may differ. DF risk is spatially clustered with different patterns for locally acquired and overseas-acquired cases.

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Resource Description

Early Warning System: ☑

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

Exposure : ☑

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Human Conflict/Displacement, Precipitation, Temperature

Temperature: Fluctuations

Geographic Feature: ☑

resource focuses on specific type of geography

None or Unspecified

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Australasia

Health Impact:

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Mosquito-borne Disease

Mosquito-borne Disease: Dengue

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology:

type of model used or methodology development is a focus of resource

Outcome Change Prediction

Population of Concern: A focus of content

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Short-Term (

Vulnerability/Impact Assessment:

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content